

# GAPS LIST SPACE CROP PRODUCTION INTERVIEW EVALUATION

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# Challenges with: Growing Plants in Space

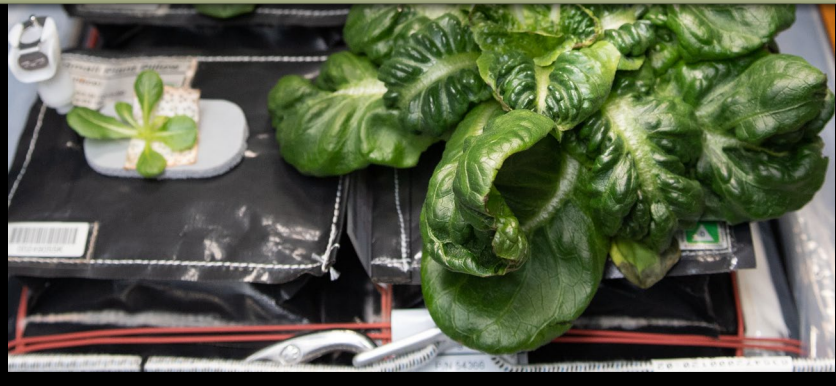
- Typical space environment factors:

- Higher radiation
- Lower pressures
- Higher CO<sub>2</sub> levels
- Hypoxia
- No natural convection
- No Gravitropic response

And many others!



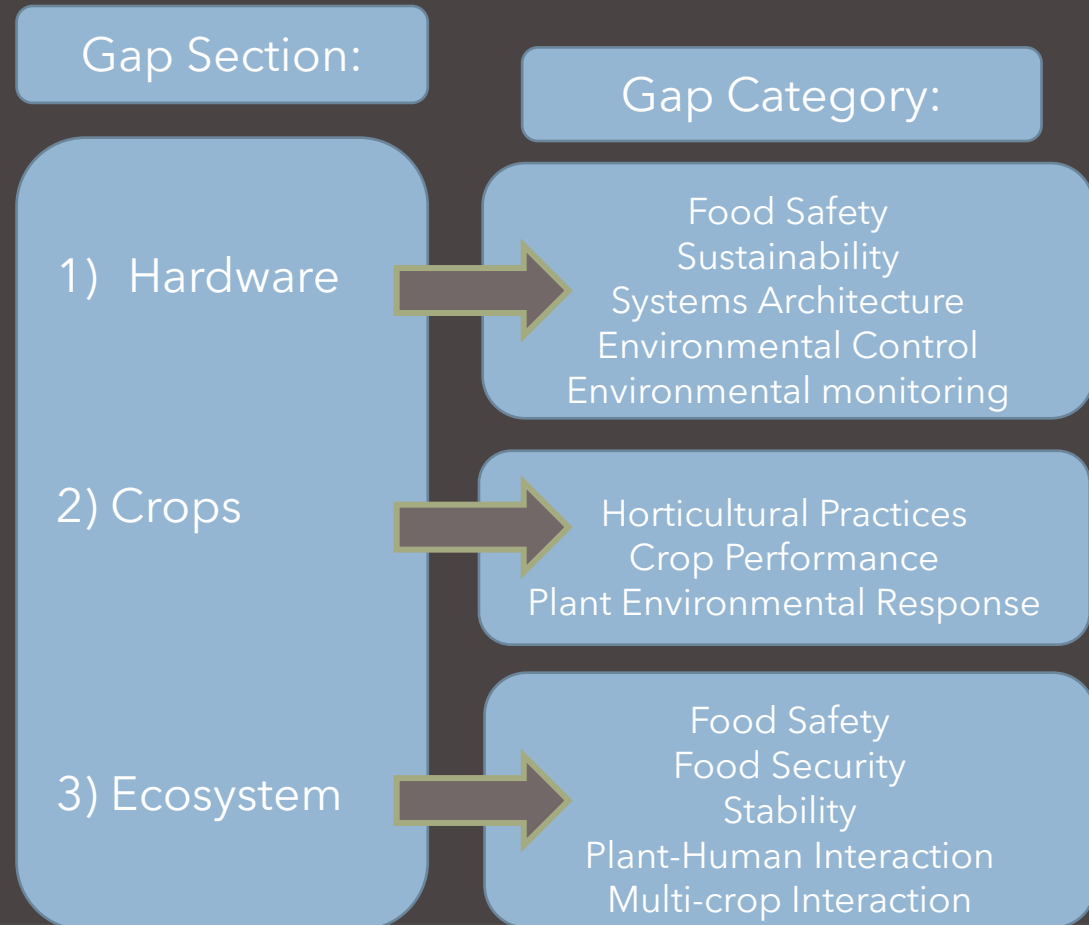
How can we solve these  
issues systematically?



# The Gaps List

Gap ID	Section	Category	Sub-gap	Keyword	Description
1.B.1.0.1	Hardware	Environmental Control	µg Water/Nutrient Delivery	Water Delivery	Lack ability to effectively provide adequate and uniform delivery of water and nutrients to root zones in relevant space environments

- A list of hierarchically arranged issues
  - Attainable
  - Lacking technology or knowledge



# 2- Step Interview Process

## Interview 1

- Introduction to all current projects



## Interview 2

- Assigned each project to the appropriate gaps

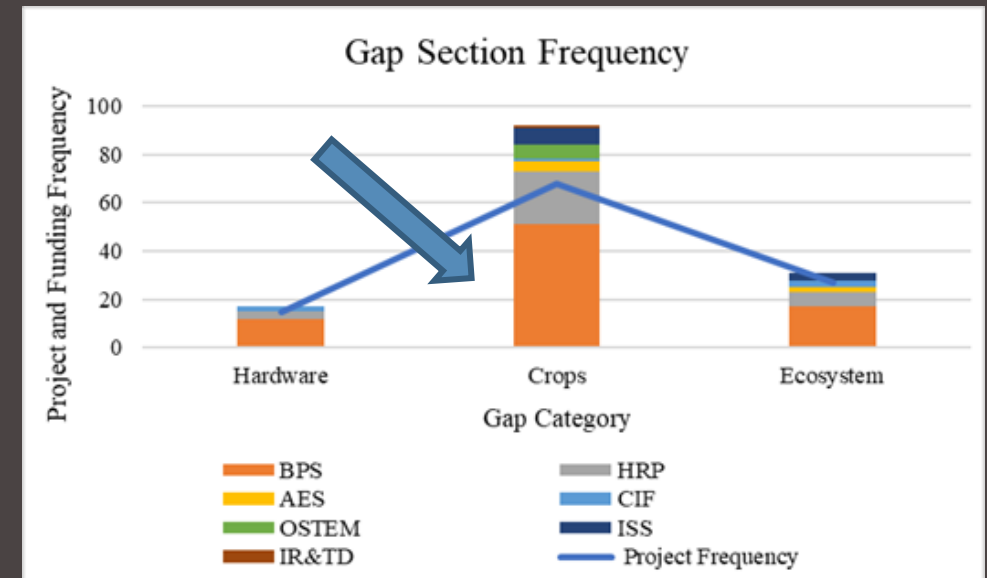
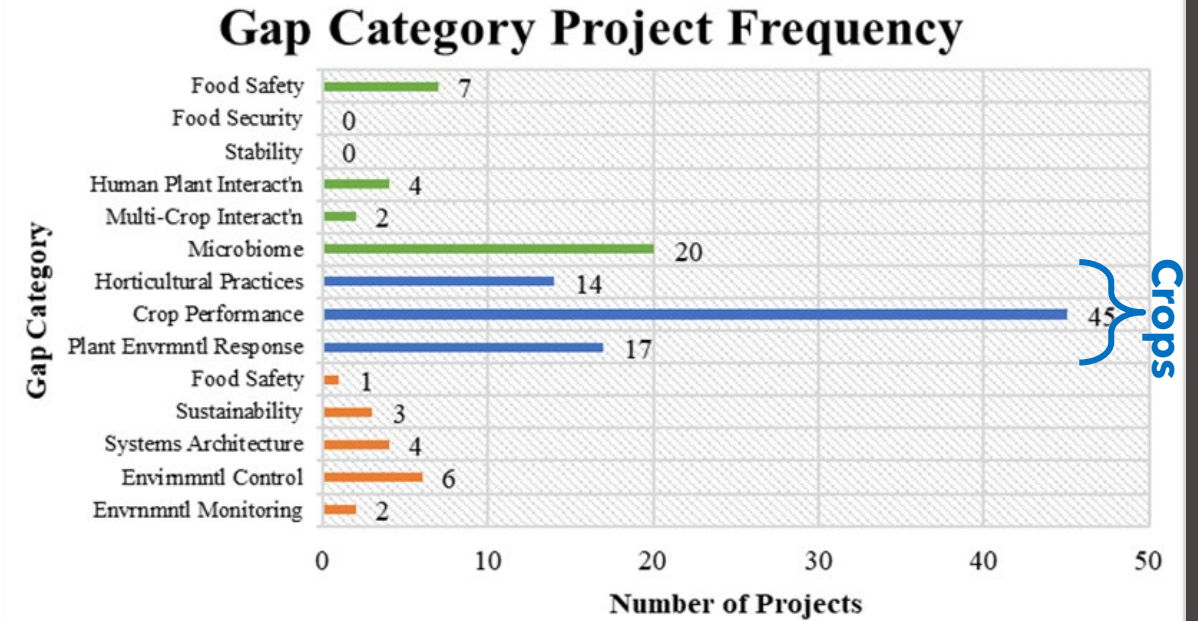


### **Subject group:**

KSC SCP Project Scientists and  
Post-Doctoral Researchers and  
their current research

# Crops

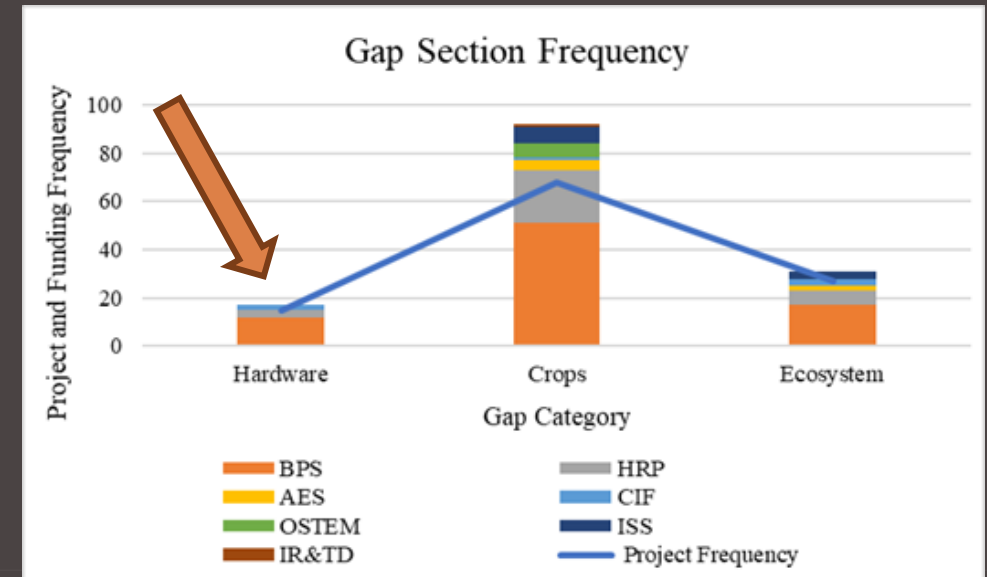
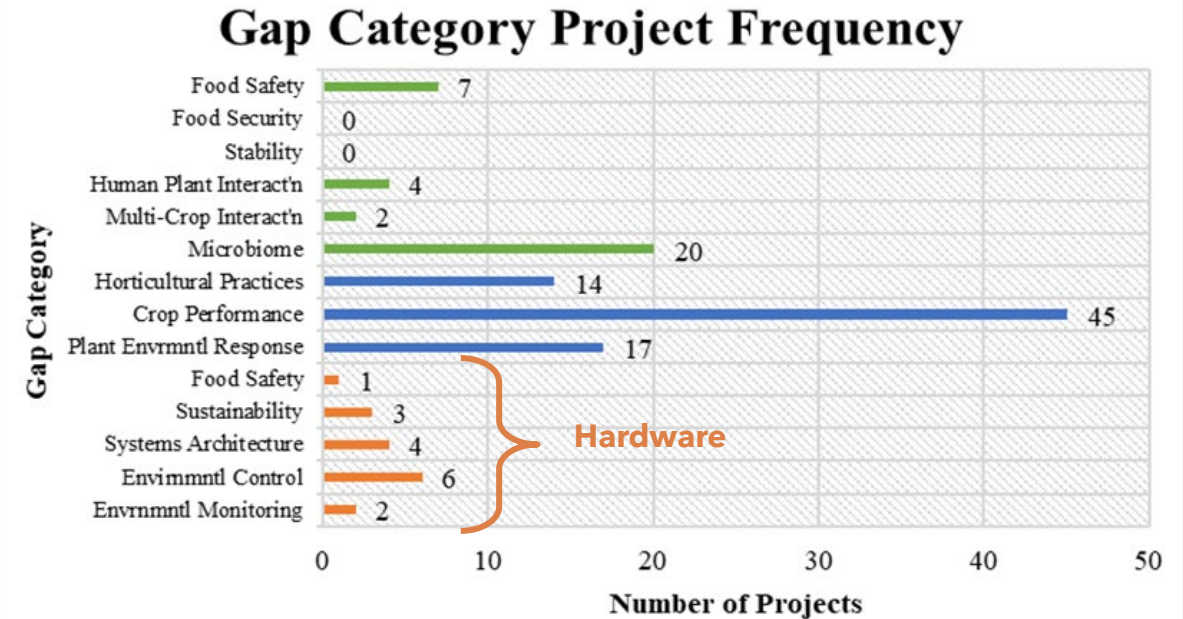
- (1) several plant growth factors for all candidate crops
- (2) BPS is the main benefactor and is interested in crop growth responses that inform fundamental biological knowledge
- A measure of Scope within the gaps list ensure understanding of the amount of time and support necessary to close the gap





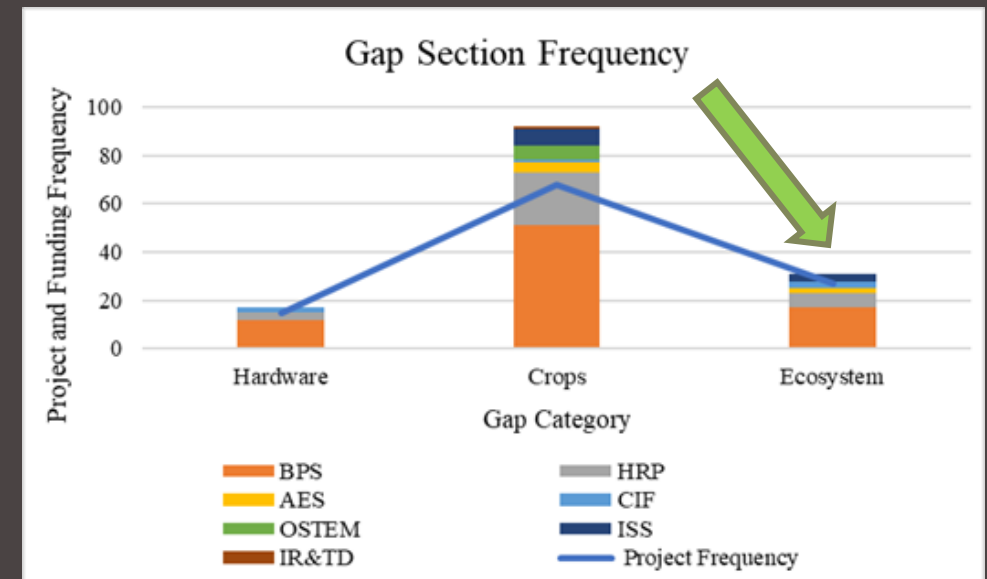
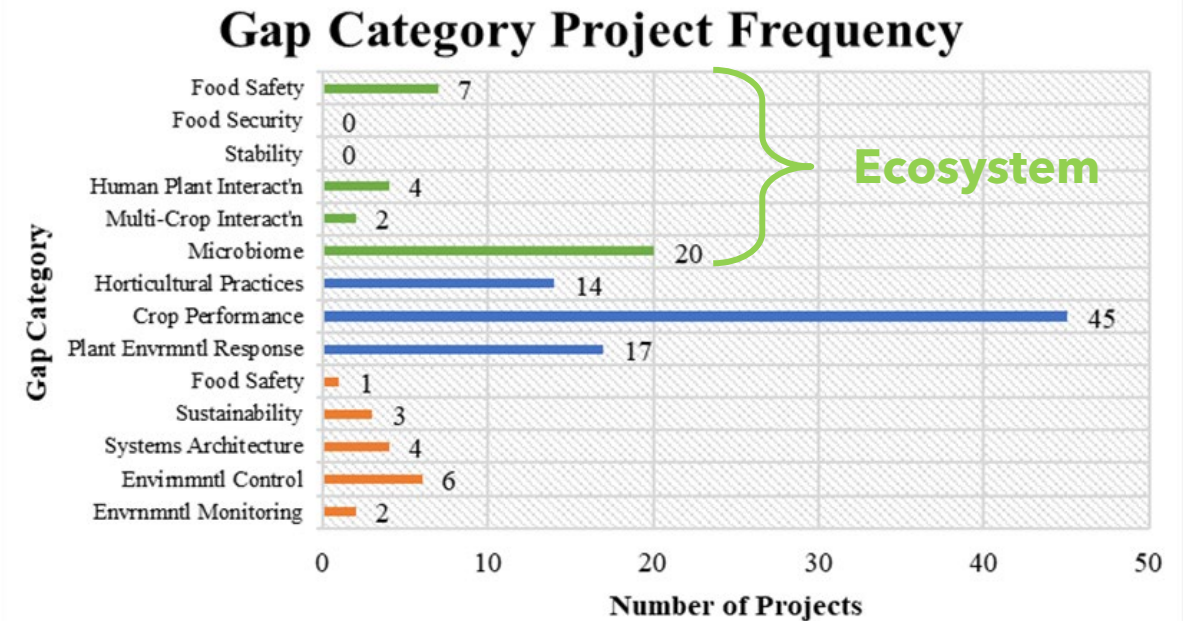
# Hardware

- Hardware was the least frequent gap section
- SCP is shifting toward large scale production
- A measure of Priority within the gaps list will draw attention to pertinent gaps



# Ecosystem

- Highest number of gaps with 0 representation
- Many Gaps in this section are very complicated/ depend on multiple factors
- A measure of Dependency within the gaps list will draw attention to gaps that must be completed before others



# Overall, we found...

- The Gaps List method is effective.
- The Gaps List was out of date.
- An efficient rate of progress will likely be achieved if adequate support is given to all sections of the Gaps List and the following recommendations are implemented.



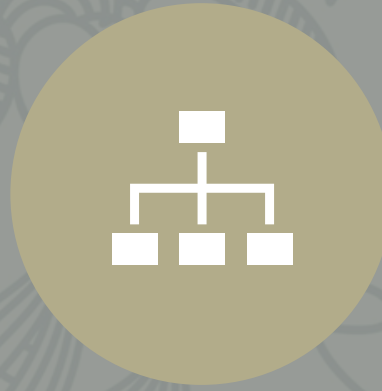
# Recommendations

To have these 3 aspects included within or along side the Gaps List:



## PRIORITY

Create a new list  
that measures  
priority



## DEPENDENCY

Create a roadmap of gaps  
to be completed in  
succession



## SCOPE

Include words that  
define scope within  
Gap descriptions

# Recommendations

Reevaluate the Gaps List at Regular intervals to assure congruency with the current research questions



## REEVALUATE



# THANK YOU

## Mentors and Co-Authors:

- Gioia Massa and Ralph Fritsche

## Interviewees:

- Gioia Massa
- Christina Johnson
- Lucie Poulet
- Raymond Wheeler
- Matt Romeyn
- Aubrie Orourke
- Ye Zhang

